Remarks/Arguments:

Claims 7 and 18 have been amended. No new matter is introduced herein. Claims 2 and 7 - 26 are pending.

Applicant's attorney thanks Examiner Song for the telephone interview of January 30, 2007. During the course of the interview, Applicant's representative discussed the differences between Zairi et al. (U.S. 2003/0108304), Koh et al. (U.S. Pat. No. 6,628,854), Tada (U.S. Pat. No. 5,684,902) and respective claims 7 and 13. In particular, Applicant's representative requested clarification on how the U-shaped recess of Koh would be combined with the base 38 of Ziari et al. such that an optical component provided in the substrate is mounted to a base that is distinct from the substrate, as recited in claim 7 of the subject invention. The examiner argued that an aperture could be broadly defined as being equivalent to a recess. Applicant's representative proposed amending claim 7 to clarify that the substrate is mounted on the base. Accordingly, the proposed amendment would clarify that an optical component is provided in an aperture of the substrate that is mounted to a base and that the optical component is mounted to the base. The Examiner acknowledged that the proposed amendment to claim 7 would overcome the rejection of claim 7. With respect to claim 13, Applicant's representative discussed that the optical component region of Ziari et al., in Figs.7a-b, is provided on thermally insulating material 94 which is in the substrate 92 and is thus not formed directly on semiconductor substrate 92, as recited in claim 13 of the subject invention. In addition, Applicant's representative also noted that Tada discloses an optical fiber 6 that is mounted in a groove 2 and separated from an end facet of a laser chip 3 by overhanging part 4. Tada, thus, can not disclose a substrate having a substantially planar fiber mount region formed directly on the substrate, as recited in claim 13. The Examiner clarified her interpretation of a fiber mount region. Applicant's representative noted that Tada discloses an active layer that is formed on a cladding layer. Thus Tada does not disclose or suggest that the active layer is formed on the substrate of the laser module, as recited in claim 13. No agreement was reached.

Claims 2, 7 - 12 and 18 - 20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Koh et al. This ground for rejection is overcome by the amendment to claims 7 and 18. In particular, neither Zairi et al., Koh et al. nor their combination disclose or suggest:

> "a substrate having an optical component mount aperture formed therein... the substrate is mounted to a base that is distinct from the substrate, the optical component mount aperture is configured to receive an optical component therein and the optical component is mounted to the base that is distinct from the substrate,"

as required by claim 7 or

> "mounting the substrate to a base that is distinct from the substrate...placing an optical component within an area defined by the optical component mountable aperture to mount the optical component to the base that is distinct from the substrate,"

as required by claim 18. Support for the amendment may be found, for example, at p. [0040] and Figs. 2, 4 and 5.

Zairi et al. disclose, in Fig. 2, a laser 32 attached to a laser submount 38 where the submount 38 is provided on substrate 42 (paragraph [0028]). Zairi et al. do not disclose or suggest "a substrate having an optical component mount aperture formed therein" where "the optical component mount aperture is configured to receive an optical component therein" or that "the **substrate is mounted to a base** that is distinct from the substrate... and the optical component is mounted to the base," as required by Claim 7. Zairi et al. do not disclose or suggest that the substrate has a component mount aperture that is configured to receive an optical component mounted in the fiber mount region. Thus, Zairi et al. can not disclose or suggest that an optical component **provided in a substrate** is mounted to a base that is distinct from the substrate where the substrate is mounted to the base.

Koh et al. disclose, in Figs. 2 and 4, a silicon bench 6 that includes **U-shaped recesses** 7a, 8a, 9a and 10a to receive a variety of optical devices (Col. 4, line 6 - 10). Koh et al. do not disclose or suggest "a substrate having an optical component mount **aperture** formed therein" where "the optical component mount aperture is configured to receive an optical component therein" or that "the substrate is mounted to a base that is distinct from the substrate... and the **optical component is mounted to the base**" (emphasis added). These features are neither disclosed or suggested by Koh et al. Koh et al., instead, disclose that the silicon bench includes recesses to receive optical devices where, as shown in Fig. 4, the **recesses do not completely pass through** the silicon bench. Because the recesses do not completely pass through the silicon bench, the recesses do not allow optical components to be mounted to a base that is

distinct from the substrate where the substrate is mounted to the base. Consequently, **the recesses prevents optical components from being mounted to a base** that is distinct from the substrate. Thus, Koh et al. can not disclose or suggest that an optical component **provided in a substrate** is mounted to a base that is distinct from the substrate where the substrate is mounted to the base. Accordingly, Koh et al. do not include all of the features of claim 7.

As described above, Koh et al. disclose recesses 7a, 8a, 9a and 10a that do not completely pass through the silicon bench 6. Although Ziari et al. describe that a laser 32 is attached to submount 38, the skilled person would not combine the silicon bench 6 of Koh et al. having recesses 7a, 8a, 9a and 10a with the submount 38 of Ziari et al. to produce the subject invention, as recited in Applicants' claim 7. Instead, an optical component provided in a recess of silicon bench 6 would be prevented from being mounted to submount 38 of Ziari et al. As acknowledged by the examiner, the combination would not teach all of the limitations of claim 7, as amended. It follows that it would not have been obvious for the skilled person to combine the inventions of Ziari et al. and Koh et al. to produce Applicants' invention, as recited in claim 7, at the time Applicants' invention was made. It is well established that:

> To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. (emphasis added)[1]

Accordingly, for the reasons set forth above, a *prima facie* obviousness has not been established.

Therefore, neither Zairi et al., Koh et al., nor their combination disclose or suggest applicant's features as required by claim 7 and is not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Koh et al. Because claims 2 and 8 - 12

[1] MPEP §706.02(j)

`depend from claim 7, they are also not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Koh et al.

Claim 18 includes limitations similar to the limitations of claim 7 that are neither disclosed nor suggested by Zairi et al. or Koh et al. Namely: forming an optical component mountable aperture on a surface of the substrate, mounting the substrate to a base that is distinct from the substrate and placing an optical component within an area defined by the optical component mountable aperture such that the optical component is mounted to the base. As described above, neither Zairi et al., Koh et al. nor their combination include all of these features. Thus, Zairi et al. and Koh et al. either alone or in combination, do not disclose all of the features of claim 18.

Accordingly, claim 18 is not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Koh et al. Because claims 19 and 20 include all of the features of claim 18 from which they depend, claims 19 and 20 are also not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Koh et al.

Claims 13 - 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Tada. This ground for rejection is respectfully traversed.

Neither Zairi et al., Tada nor their combination disclose or suggest "a substrate formed from a semiconductor of a first conductivity type and having ...a substantially planar fiber mount region formed directly on the substrate" or "an active layer... formed on the substrate," as required by claim 13.

Ziari et al. disclose, in Fig. 7A, an optical connection module 90 that includes a laser 95 mounted to substrate 92 (paragraph [0036]). Zairi et al. do not disclose or suggest a laser comprising an active layer, a semiconductor layer, an electrode layer or an optical output coupler formed on a surface of the active layer, as required by claim 13. Although Ziari et al. generally discloses a laser, Ziari et al. are silent on a laser having an active layer formed on the substrate over the optical component region, as recited in claim 13.

In addition, Zairi et al. disclose, in Fig. 7A, an optical connection module 90 that includes a substrate 92 and a **thermally insulating material 94 integrated into the substrate** 92. A

fiber bonding pad 96 for is attached to thermally insulating material 94 and an optical fiber 102 is attached to bonding pad 96 (paragraph [0036]). Zairi et al. do not disclose or suggest applicant's features of "a substantially planar **fiber mount region formed directly on the substrate**" (emphasis added), as recited in claim 13. At paragraph 34 of the Office Action, the Examiner asserts that "Although the fiber is not directly bonded to the substrate (i.e. the fiber is bonded by an intervening submount and bonding pads), the fiber mount region may constitute the area at which the fiber is mounted directly or indirectly (i.e. the area under the fiber subassembly) and is formed directly on the substrate." Applicants respectfully disagree. Applicants' claim 13 does not recite that the fiber is directly bonded to the substrate. Instead, claim 13 recites a substantially planar **fiber mount region is formed directly on the substrate.** In Zairi et al., an optical component region is provided on thermally insulating material 94 which is in the substrate 92. According to Ziari et al, the optical component region itself is not formed directly on semiconductor substrate 92. Thus, Ziari et al. are silent on forming a substantially planar fiber mount region directly on the substrate.

In addition, at paragraph 34 of the Office Action, the Examiner asserts that dependent claims 14-17 suggest that the fiber is not in direct contact with the substrate. Claims 14-17, however, recite a mount pad formed over the fiber mount region but do not disclose or suggest that the fiber mount region is prevented from direct contact with the substrate. Thus, for the reasons set forth above, Zairi et al. do not disclose all of the features of claim 13.

Tada discloses, in Figures 1 and 2(f), a semiconductor laser module including a laser chip 3 disposed on a Si substrate 1 (Col. 5, lines 1-10). As shown in Fig. 2(f), laser chip 3 includes an InP substrate 7, a cladding layer 8 and active layer 5 (Col.5, lines 24-32). Tada does not disclose or suggest a laser having an active layer formed on the substrate, as recited in claim 13. Tada, instead, teach that the active layer 5 is formed on a cladding 8 and that the laser chip has a further InP substrate 7 formed on Si substrate 1. Tada is silent on forming an active layer of the laser chip on the Si substrate.

Furthermore, Tada disclose that an optical fiber 6 is disposed in a V-shaped groove 2 of the substrate. The laser chip 3 has an overhanging part 4 such that cladding part 61 of optical fiber 6 contacts the overhanging part 4 (Col. 5, lines 7 - 18). Tada does not disclose or suggest a substantially planar fiber mount region being formed directly on the substrate, as recited in claim 13. Instead, Tada discloses mounting an optical fiber using groove 2 and fixing the fiber

to a predetermined position in the optical axis direction using the overhanging part 4. As recited at Col. 7, lines 16-39):

> ...the **position** of the optical fiber 6 **in the horizontal direction and the vertical direction is decided by the configuration of the V groove** 2, and the position of the optical fiber 6 **in the optical axis direction is decided self-alignedly by the length of the overhanging part 4** of the laser chip 3 which is formed in advance whereas it is decided by a rectangular groove or a fiber stopper in the prior art semiconductor laser module. ... As a result, the optical fiber 6 is accurately aligned with the semiconductor laser chip 3 in the optical axis direction while maintaining a desired space between the active layer 5 of the laser chip 3 and the end facet of the optical fiber 6. Furthermore, **since the alignment in the optical axis direction is performed by just applying the end facet of the optical fiber 6 to the overhanging part 4** of the laser chip 3 and **no adjustment is necessary**, the light emitting facet of the laser chip 3 is not damaged by the optical fiber 6, resulting in a semiconductor laser module having a high coupling efficiency between a semiconductor laser and an optical fiber.

Because the optical fiber 6 is mounted in groove 2 and separated from an end facet of a laser chip 3 by overhanging part 4, Tada can not disclose a substrate having a substantially planar fiber mount region formed directly on the substrate or that the fiber mount region is configured to permit alignment of the optical fiber in first and second directions using at least a top view and a side view, as recited in claim 13. As set forth above, Tada fixes the optical fiber 6 in the groove 2, thus preventing alignment in first and second directions. In addition, the overhanging part 4 prevents alignment using a top view. Accordingly, for the reasons set forth above, Tada does not include all of the features of claim 13.

Because neither Zairi et al., Tada nor their combination disclose all of features that claim 13, claim 13 is not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Tada. As claims 14 - 17 include all of the features of claim 13 from which they depend, claims 14 - 17 are also not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Tada.

Claims 21 - 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Tada and Doussiere et al. (U.S. Pat. No. 5,717,711). This ground for rejection is traversed for at least similar reasons to claim 13. Neither Zairi et al., Tada nor Doussiere et al. disclose or suggest "forming a substantially planar fiber mount region directly on a surface of

the substrate," or "forming an active layer... over a portion of the substrate," as required by claim 21.

As described above, neither Zairi et al. nor Tada disclose forming a substantially planar fiber mount region directly on a surface of the substrate or forming an active layer over a portion of the substrate. Doussiere et al. disclose a fiber laser coupler. Doussiere et al. do not disclose nor suggest forming a fiber mount region on a surface of the substrate. Instead, Doussiere et al. disclose a fiber mounted **in a opening** in the wall of the casing that encloses the optical device. (Fig. 3 and Col. 3, lines 54 - 60). In addition, Doussiere et al. are silent on forming an active layer of a laser over a portion of the substrate. Accordingly, Doussiere et al. do not provide the material that is missing from Zairi et al. and Tada. Consequently, claim 21 is not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Tada and Doussiere et al. Because claims 22 and 23 include all of the features of claim 21 from which they depend, claims 22 and 23 are also not subject to rejection under 35 U.S.C. 103(a) as being unpatentable over Zairi et al. in view of Tada and Doussiere et al.

Applicants acknowledge with appreciation the Examiner's finding that claims 24-26 are allowed.

In view of the foregoing remarks, Applicant requests that the Examiner reconsider and withdraw the rejection of claim 2 and 7 - 23.

Respectfully submitted,

Kenneth N. Nigon, Reg. No. 31,549
Attorney for Applicant

KNN/drm/pb

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☒ P.O. Box 980
Valley Forge, PA 19482
(610) 407-0700

☐ P.O. Box 1596
Wilmington, DE 19899
(302) 778-2500

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